Newcastle Section.

Chairman: *T. W. Stuart.*
Vice-Chairman: *P. P. Bedson.*

Committee:

A. Allhusen.
G. T. France.
G. Gatheral.
John Glover.
T. W. Lovibond.
John Pattinson.
H. R. Procter.
B. S. Proctor.
W. W. Proctor.
W. L. Rennoldson.
C. H. Ridsdale.
J. E. Stead.

Hon. Local Secretary and Treasurer:
Dr. J. T. Dunn, The School, Gateshead.

The names in Italics are those of members of Committee who retire at the close of the current Session. The following have been elected to fill the vacancies, and will take office in July next:—*Chairman:* John Pattinson; *Vice-Chairman:* T. W. Stuart; *Committee:* P. P. Bedson, C. H. Hills, and T. W. Hogg.

Notices of Papers and Communications for the Meetings to be sent to the Local Secretary.

Manchester Section.

The Committee of this Section is unchanged.

Nottingham Section.

The Committee of this Section is unchanged.

Glasgow and Scottish Section.

Chairman: *R. R. Tatlock.*
Vice-Chairman: *Wm. Dittmar.*

Committee:

G. Beilby.
Wm. Boyd.
A. Crum Brown.
J. Christie.
W. S. Curphey.
D. B. Dott.
Wm. Foulis.
J. Gibson.
R. Irvine.
G. McRoberts.
E. J. Mills.
J. M. Milne.
T. L. Patterson.
E. Smith.
E. C. C. Stanford.
A. Whitelaw.

Hon. Treasurer: *W. J. Chrystal.*

Hon. Local Secretary:
Dr. G. G. Henderson, Chemical Laboratory, University of Glasgow.

The names in Italics are those of members of Committee who retire at the end of the current Session. The following have been selected to fill the vacancies, and will take office in July next:—*Chairman:* E. C. C. Stanford; *Vice-Chairman:* A. Crum Brown; *Secretary:* G. G. Henderson; *Treasurer:* W. J. Chrystal; *Committee:* W. J. A. Donald, C. A. Fawsitt, J. Falconer King, T. P. Miller, J. Pattison, and R. R. Tatlock.

SESSION 1890.

May 6th (Edinburgh):—
Dr. J. B. Readman. "The Manufacture of Phosphorus, Part II."
Mr. G. McRoberts. "Blasting Gelatin and other Explosives."

June 3rd (Glasgow):—
Dr. J. Clark and Mr. McGhie. "A new Cobalt Mineral.'

Notices of Papers and Communications for the Meetings to be sent to the Local Secretary.

Meeting held in the Societies' Rooms, 207, Bath Street, Glasgow, on Tuesday, 1st April 1890.

MR. R. R. TATLOCK IN THE CHAIR.

NOTE ON THE FATTY ACIDS OF OLIVE AND OTHER OILS.

BY ROBERT R. TATLOCK, F.R.S.E., F.I.C., F.C.S.

In estimating the fatty acids in olive-oil soap I have always and very frequently noticed that after the acids were dried till every trace of water had been expelled they continued to lose weight by exposure to the temperature of the water-oven, which is usually about 90° C. (194° F.). That this loss resulted from the volatilisation of some substance, probably of an acid character, which had been in combination with soda, there could be little doubt, and subsequent experiments confirmed this view. In any case the substance dissipated was not water, and as its amount was considerable the question arose as to whether it should be regarded as a portion of the fatty acids, or merely as an inoperative substance incapable, even in combination with soda, of contributing to the detergent properties of the soap, and consequently of little or no value. At first it was thought probable that this volatile body existed only in the oil which had been extracted from the olives by chemical means or solvents (bisulphide of carbon), and which is commonly employed for the manufacture of this class of soap, and that it would not be present in the oil expressed by mechanical means. It was soon found by experiment, however, that it existed in these two varieties to an equal extent as nearly as possible. On extending the investigation to other oils I soon found that while the fatty acids of some of these behaved in a similar manner to those of olive oil—giving off a volatile body at or under steam heat—there were other oils whose acids gave an opposite result, as they gained weight, undoubtedly due to oxidation, under similar circumstances, as did olive oil itself, and more particularly when it was deprived of the considerable proportion of free oleic acid almost invariably present in the commercial article. Of course it is quite possible—indeed highly probable—in the case of fatty acids of olive oil and those which behave under heat in a similar manner, that oxidation and consequent increase of weight goes on simultaneously with volatilisation and consequent decrease of weight, but that the latter goes on at a greater rate than the former, thus making it alone apparent. On the other hand it is hardly possible that the fatty acids such as stearic, that show but a slight decrease in weight after many hours' exposure, can contain any appreciable proportion of volatile substance, as if they did it would pass off at any early stage of the heating process, at least to a large extent, and would thus be observed.

The subjoined table shows the weights of 100 parts of fatty acids from various kinds of commercial olive oil, as well as those from castor, rape, cotton-seed, linseed, and stearine, and also of commercial and neutral olive oil, when exposed for various periods to a temperature of 90° C. (194° F.).

The fatty acids were in each case prepared by saponification with alcoholic potash and liberation by normal hydrochloric acid in slight excess. They were then dried until they ceased rapidly to lose weight, and no film of water could be condensed on glass by the cooling of their vapours.

It is unnecessary to interpret the results, as the figures speak so plainly for themselves. It should be noted, however, that the olive oil No. 10 was the one employed to produce the fatty acid No. 4 as well as the neutral oil No. 11, which was obtained by shaking up the oil with weak solution of caustic potash to saponify the free fatty acid, dissolving out the neutral oil by ether and recovering by evaporation.

Of course the volatile substance may be a decomposition-product of the fatty acid from which it is evolved by heat, and judging from the tardiness with which its evolution begins and progresses, it is more likely to be such than a volatile acid pre-existing in the oil. On account of this consideration I have hitherto in analysis of soaps and oils returned it as a portion of the true fatty acid.

It is obvious from these results that the determination of fatty acids in soaps is, in many instances, a delicate operation, and one requiring as much care, skill, and observation as any other part of the analysis of that material.

TABLE SHOWING LOSS (OR GAIN) IN WEIGHT OF DRY FATTY ACIDS, DURING DIFFERENT PERIODS, AT 90° C.

Time heated at 90° C. (194° F.).	1. Fatty Acids from Olive Oil.	2. Fatty Acids from Olive Oil.	3. Fatty Acids from Olive Oil.	4. Fatty Acids from Olive Oil.	5. Fatty Acids from Castor Oil.	6. Fatty Acids from Rape Oil.	7. Fatty Acids from Cotton-seed Oil.	8. Fatty Acids from Linseed Oil.	9. Stearic Acid.	10. Olive Oil containing 9·42 per Cent. Free Oleic Acid.	11. Olive Oil from which Free Fatty Acid was removed.
Dry	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00
24 hours ...	99·22	99·33	99·18	99·50	99·18	100·50	99·26	101·25	100·08	100·24	100·88
48 "	98·88	98·92	98·85	99·06	98·51	100·30	99·04	101·23	100·06	100·52	101·42
72 "	..	..	..	98·70	97·85	99·89	..	..	99·72	100·52	101·32
96 "	98·18	98·20	98·17	..	..	..	98·12	100·42	..	..	..
120 "	..	..	..	98·09	96·82	99·46	97·87	100·19	98·22	100·10	100·36
192 "	96·96	97·08	96·97	..	..	..	..	..	..	..	..
360 "	95·45	95·50	95·42	..	..	..	..	..	..	..	..
528 "	94·14	94·17	94·10	..	..	..	..	..	..	..	..
720 "	92·62	92·67	92·57	..	..	..	..	..	..	..	..

DISCUSSION.

Mr. STANFORD asked what acid was used in precipitation? His reason for asking that was because he had found it extremely difficult to wash some organic substances free from acid, and he thought it was possible some acid might have been left and become a little concentrated. He was also inclined to think there might be a small portion of glycerin left. With regard to the loss of about 8 per cent. that occurred, it seemed to him that the volatile substance might be recovered, and he hoped Mr. Tatlock would try and devise some method for doing so.

Dr. MILNE asked Mr. Tatlock if he had not employed sulphuric acid as well as hydrochloric in precipitation?

Mr. TATLOCK, in reply, said that the first three or four results were got by the use of sulphuric acid, but in the later experiments hydrochloric acid was considered to be the best. With reference to Mr. Stanford's suggestion about some of the acid being left, he should have said in his paper that the hydrochloric acid was added in very slight excess, so that the volatile substance got amounted to very many times the entire excess of acid employed. As regarded glycerin being left, considering the complete saponification with alcoholic potash, he was of opinion the glycerin must all have been washed away.

THE ESTIMATION OF COBALT AND NICKEL.

BY JAMES HOPE.

THE separation of cobalt from nickel has always been a matter of difficulty to the chemist, especially due perhaps to the extremely analogous properties of these two metals.

Many processes, however, have been devised for this purpose, but the majority have been abandoned as being in various respects faulty. The "nitrite" process, which is that most commonly recommended by text-books, is no doubt found by some to give fairly good results, but in the hands of inexperienced operators very often fails to give any results at all when cobalt is certainly known to be present. The chief objection, however, is that it is long and tedious to manipulate, which is a serious matter in a works laboratory where many analyses have daily to be made.

It must be admitted that outside of those directly connected with the subject, very few even competent chemists will be found from whom reliable results can be obtained. There is evidence of this in a case which came before my notice some time ago, in which a sample of cobalt material agreed upon by the buyer and seller at 6 per cent. was reported by a competent French chemist to contain 15 per cent. This is certainly an exaggerated instance, but there is doubtless necessity for more light being thrown on this subject, and I think I am justified in putting on record a complete process for the separation and estimation of cobalt and nickel, which, although not quite new, may still be unknown to the majority of the members of this Society.

The process consists of two operations:—

1. Separation and determination of the cobalt by the "phosphate" method.
2. Determination of the nickel by electrolysis.

The "phosphate" method was originally devised by M. Dirvell, and published in 1879, but, as then described, proved very unworkable, and it was not until modified on several important points by Dr. Clark in 1883 that its value as a means of separation was really appreciated. It has now been in daily use for several years, and has given complete satisfaction both as to accuracy and the facility with which the separation can be made.

Before proceeding to its description it may be well to describe briefly the procedure usually adopted leading up to the separation which is applicable to ores and mattes containing metals removable by H_2S in acid solution, and any iron, alumina, or manganese which may be present. A quantity of the sample is taken according to its approximate contents, but that will be found most suitable which gives about ·5 grm. or thereabouts of mixed metals. This is dissolved in HCl or aqua regia and evaporated to dryness, the residue moistened with HCl, dissolved in hot water, filtered from silica, &c., and in the filtrate metals of the second group are removed with H_2S. After oxidation with HNO_3 the filtrate is nearly neutralised with Na_2CO_3, and the iron and alumina twice precipitated with acetate of soda to ensure perfect separation. The mixed filtrates, thoroughly freed from iron and alumina, are slightly acidified with acetic acid, and the cobalt and nickel thrown down with H_2S gas, filtered, washed with H_2S water, dried, calcined, and weighed as a guide to the approximate quantity of the two metals present.